

REMARKS

Claims 1-6 and 9 are withdrawn from consideration in view of the Response to Restriction Requirement filed on March 23, 2006. Claim 7 has been amended hereinabove to differently recite the invention. Claims 7 and 8 are currently pending.

In the Office Action, the Examiner rejected claims 7 and 8 under 35 U.S.C. § 102(e) as being anticipated by U.S. Publication No. U.S. 2004/0161006 to Chang et al.; rejected claims 7 and 8 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,621,842 to Dapkus; and rejected claim 7 under 35 U.S.C. § 102(b) as being anticipated by U.S. Publication No. 2002/0075920 to Spruytte et al. Applicants traverse these rejections, at least for the following reasons.

Applicants submit that the applied references of record do not disclose or suggest the quantum cascade laser recited in Applicants' claim 7 having a unipolar laser device structure; and an active layer, disposed on said semiconductor substrate and having a plurality of quantum well light emitting layers, each having a quantum well structure including a quantum well layer and quantum barrier layer and generating light by means of intersubband transitions in the quantum well structure, wherein in said active layer, electrons move successively in a cascading manner among said quantum well light emitting layers, and light is generated in the process of the intersubband transition at each light emitting layer.

As discussed in Applicants' specification at paragraph [0005], page 2, lines 15-26, "with a quantum cascade laser, a high output is enabled by a cascade structure in which quantum well light emitting layers are disposed in multiple layers. A quantum cascade laser furthermore has great potential as an infrared coherent light source due to being a unipolar device that makes use of intersubband transitions as mentioned above and not having a PN junction, being able to generate ultrashort pulse light at a frequency response of high speed, being small in relaxation

oscillation, enabling multiple wavelength emission and broadband emission, and being excellent in temperature characteristics.”

Applicants’ specification goes on to state, at paragraph [0121], page 38, lines 12-18, that “As shown in Fig. 8, each of quantum well light emitting layers 502 and 504 is formed of quantum well layers 510 and quantum barrier layers 511. In each of light emitting layers 502 and 504, a subband B1 and a subband B2 are formed, for example, from localized quantum levels $n = 1$ and 2 by these quantum well layers 510 and quantum barrier layers 511.”

Applicants’ specification also states, at paragraph [0124], which bridges pages 39 and 40 of the specification, that “When a plurality of such quantum well light emitting layers, which generate light by the above-described intersubband transitions in the quantum well structure, and injection layers are laminated alternately, electrons move successively in a cascading manner among the quantum well light emitting layers and light $h\nu$ is generated in the process of intersubband transition at each light emitting layer.”

Consistent with such disclosure, Applicants’ independent claim 7, as currently amended, recites: (1) that the quantum cascade laser of the present invention relates to a unipolar laser device structure; (2) that the quantum well light emitting layer in the active layer has a quantum well structure including a quantum well layer and quantum barrier layer; and (3) that in the active layer, electrons move successively in a cascading manner among the quantum well light emitting layers, and light is generated in the process of the intersubband transition at each light emitting layer.

In the previous response filed on June 28, 2006, Applicants pointed out that the device structures disclosed in the applied references of record are different from the structure that was recited in Applicants’ claim 7. That is, the applied references to Chang, Dapkus, and Spruytte do not disclose or suggest the subject matter recited in Applicants’ independent claim 7.

The Examiner responded in the pending August 11, 2006 Office Action by asserting that limitations such as "unipolar device" were not recited in independent claim 7. However, as amended, claim 7 now clearly calls for a quantum cascade laser having a unipolar laser device. Moreover, in accordance with amended claim 7, the quantum well light emitting layer in the active layer has a quantum well structure includes a quantum well layer and quantum barrier layer, and in the active layer, electrons move successively in a cascading manner among the quantum well light emitting layers, and light is generated in the process of the intersubband transition at each light emitting layer. For at least the foregoing reasons, and the reasons set forth in the Amendment filed on June 28, 2006, Applicants respectfully submit that independent claim 7 and dependent claim 8 patentably distinguish over Chang, Dapkus, and Spruytte, whether taken alone or viewed in combination with one another.

In view of the foregoing, Applicants submit that the applied references of record do not disclose or suggest the quantum cascade laser recited in Applicants' claim 7. Accordingly, reconsideration and withdrawal of the rejections applied to claim 7 and its dependent claim 8 are respectfully requested.


CONCLUSION

In view of the foregoing, Applicants respectfully request reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

Respectfully submitted,

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